Making GIS & Transit ITS Technology Work

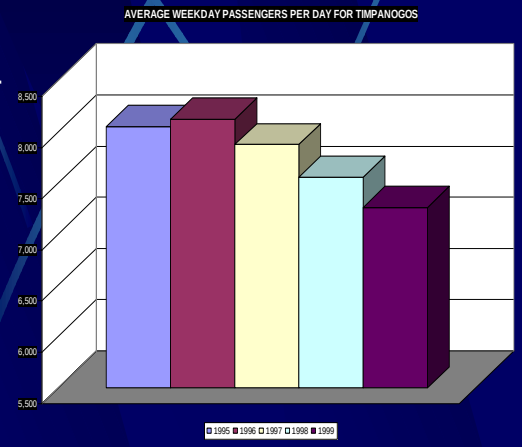
GIS and ITS in the Realignment of Utah County Bus Service

ITS Development at UTA

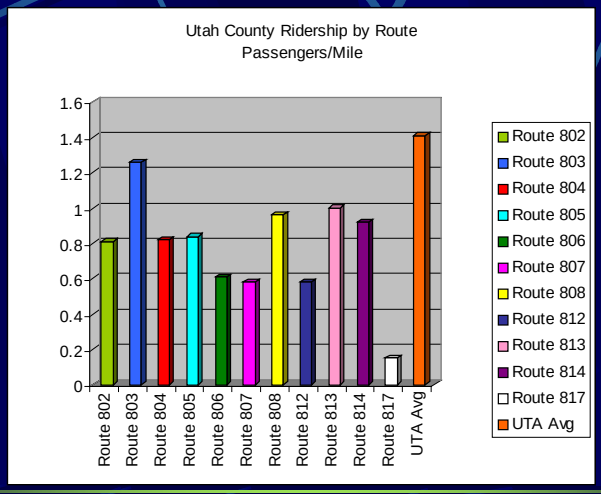
- Understanding practical uses
- Highest priority - automated passenger counters
- Biggest payoff for lowest cost
- 18 month test deployment of APCs
- 50 bus full deployment near completion

Utah County
Problem – Decreasing Ridership

- Ridership dropping
- System designed for coverage
- Rural areas difficult to serve
- Potential for county to withdraw from transit service district



Utah County
Problem - Poorly Performing Routes



Solution Strategy

- Preliminary analysis to understand the nature of the problem
  - What are the transit markets?
  - Where are our customer's origins?
  - What are their destinations?
  - What are the demographic profiles of the service area?

Solution Strategy

Three Phase Market Analysis

- Current ridership
  - Sample every trip
- Survey of current customers
  - 2 markets, local & express
  - Customer profiles
  - Trip purposes
- Market location
  - Demographic data and GIS

APC Process

- Three APCs used to gather all information
- Sample all trips at least three times
- Information to be reported at Service Development team meetings

APC Graphic Pre-Change Spatial Distribution

Survey Results

- Express Market - Commuters, Diverse Characteristics
- Local market
  - Students
  - Transit dependant
    - Lower income
    - Renters
    - Service industries

Utah County 2000 Transit Improvement Project

- **Local Market**
  - **University Students** **45%**
  - **Transit-Oriented Users** **48%**
  - **Other** **7%**

Utah County 2000 Transit Improvement Project

Of all local market trips,

students account for:

- **81% of school trips.**
- **24% of work trips.**
- **47% of shopping trips.**
- **47% of recreation trips.**
- **27% of medical trips**
- **29% of misc. reasons.**

transit-oriented users account for:

- **17% of school trips.**
- **65% of work trips.**
- **48% of shopping trips.**
- **50% of recreation trips.**
- **71% of medical trips**
- **63% of misc. reasons.**

Pre - Change Routes

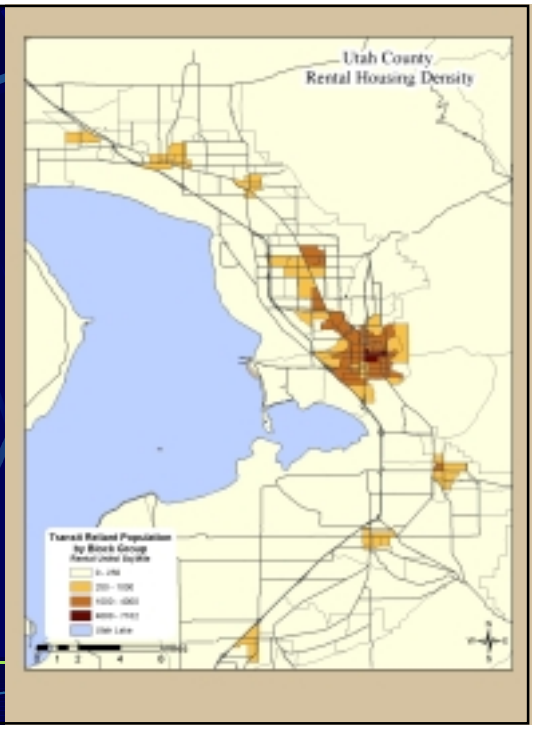
•Designed for Coverage

•Created as various cities joined service district

•Long routes and low frequency

GIS

- Demographic Data
  - Claritas
  - Transit Oriented
    - Rental Housing



GIS

- Demographic Data
  - Transit Oriented
    - Household Income under $30,000/ Year

GIS

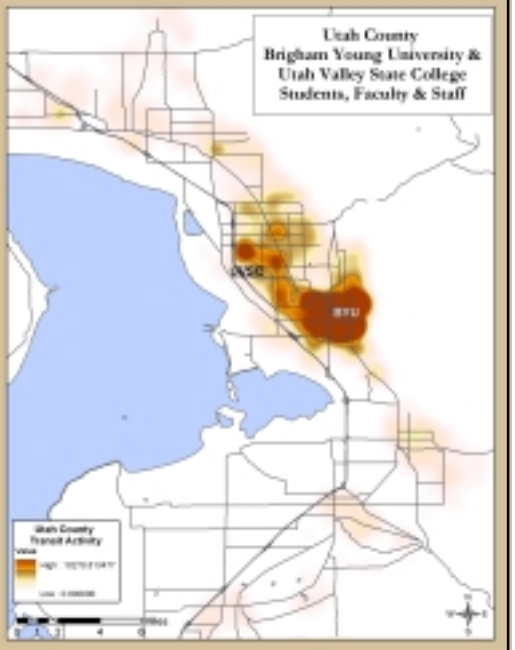
- Trip generators
  - License plate surveys
  - Major employer lists
  - Malls

GIS

- Universities
  - BYU & UVSC
  - Students
  - Faculty
  - Staff
- Spatial Analyst

GIS

•Density of Students, Faculty, Staff at BYU & UVSC



Analysis

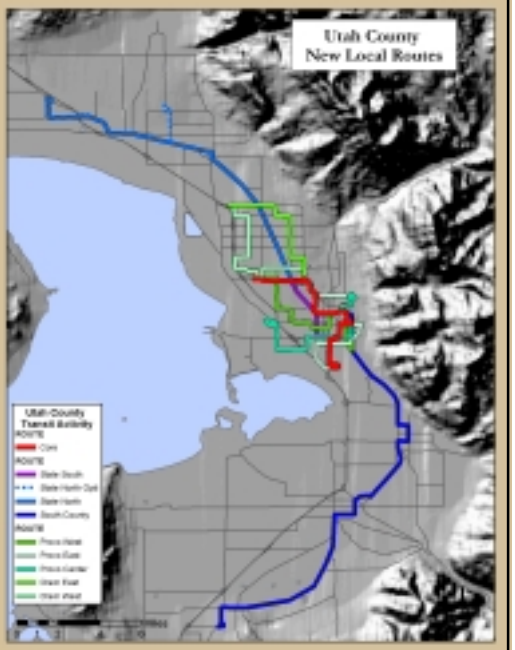
- GIS overlay
  - Buffer, Intersect, Proportional Sum
  - Walking access, Network Analyst
  - Optimum Path, Spatial Analyst
- Typical day - APC
- Density - Students & Population
- Paratransit Service Area Change
- Political Evaluation

Route Design

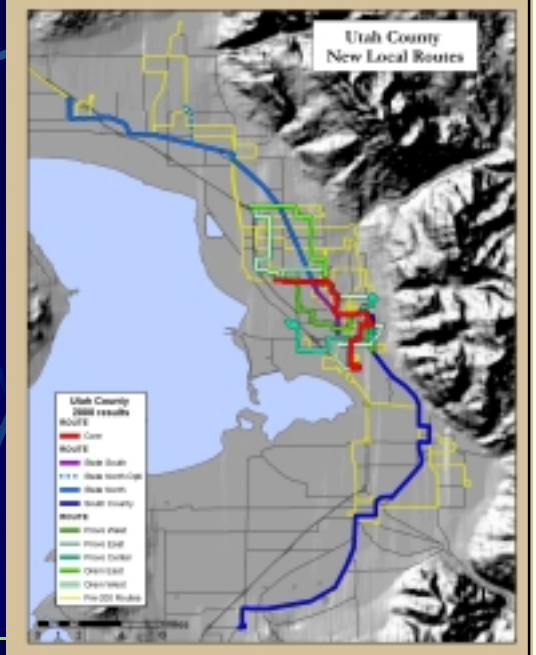
- Core route
- High frequency
- Good connectivity
- Increased potential trips
  - (Pop. within .25 mi) x (number of trips)
- Focus on market
- Improved opportunity

Route Design

- Local Routes
- Decrease coverage in areas w/o market density
- Coordinated connections at key transfer locations



Before & After



Results

- Implementation was August 2000
  - 6 months of data available on changes
    - Passengers/Day up 7.7%
    - Revenue Miles/Day down 13.7%
    - Revenue Hours/Day down 1.3%
    - Trips/Day up 44.1%
    - Passengers/Mile from .74 to .93 - up 25.7%
    - Passengers/Hour from 15.5 to 16.9 - up 8.9%
    - Passengers/Trip from 17.7 to 13.2 - down 25.5%

	Pass/Day	Rev.Mi/Day	Rev.Hrs/Day	Trips/Day	Pass/Day	Pass/Mile	Pass/hour	Pass/Trip
Before	7360	9846	474	415	7360	0.74	15.52	17.73
After	7927	8501	468	598	7927	0.93	16.9	13.2
% Change	7.7	-13.7	-1.3	44.1	7.7	25.7	8.9	-25.5